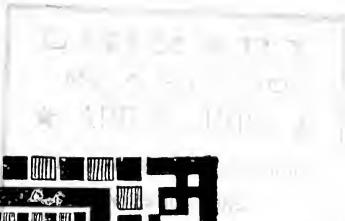


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1914



TREES FOR THE PRAIRIE

THEIR VALUE AND WHY



DEVILS LAKE NURSERY
Devils Lake, N. D.

THE MISSION OF HORTICULTURE.

Address Delivered by John W. Maher at Minnesota Horticultural Meeting, 1914.

Horticulture is the handmaid of Agriculture. They supplement and aid each other and belong together. Horticulture is especially necessary to agriculture on the plains.

The prairie is always an anomaly. It is a mistake. It is not intended in the economy of nature. All fertile soil produces forest. Timber, the highest type of plant life, is the protector, the guardian of all other plant life, as well as the protector and natural home of all animal life. It is Nature's shield and cover for all fertile soil. It gives back to the soil more than it receives from it, constantly adding to its fertility and holding it in place. All fertile soil will produce a forest cover if not prevented from so doing by some external cause. Fire is the parent of the prairie. It clears great level areas of forest and recurs often enough to prevent reforesting.

Soil fertility cannot be maintained on large areas devoid of forest and desert conditions necessarily result. On account of this fact, Germany has 35 million acres of her 120 million acre area, about one-third, in forest, and all other European countries are dividing and subdividing their already small fields by rows or belts of timber. In no place are they cutting out the timber belts so as to enlarge the fields, but new rows and belts are being put in, whenever protection from winds or storms or drifting or washing of the soil, or any other cause requires them. If one-third timber is necessary in the mild humid European climate where the price of land is \$200 per acre and up, how much must we plant in our dry cold climate to give adequate protection to the soil and crops? We must acquaint ourselves with the many uses and the value of timber growth, and how to plant and grow the trees. Here Horticulture comes to the aid of Agriculture.

The commercial orchard came at about the same time as the bonanza farm, at the beginning of "Big Business" in the late seventies and early eighties. The fruit markets were then supplied by the surplus from the farm orchards. The "farm orchard" was found to be the most lucrative part of the farm. It supplied plenty of fresh, preserved and dried fruit for the farm kitchen, and the surplus, as a rule, brought a better return than any other equal area on the farm. The expense of planting and caring for the orchard was very small. Apples were the most easily grown as well as the most profitable crop. There were not many wormy apples in those days. The chickens, geese, pigs, sheep, or calves were usually turned into the orchard to eat the wind-falls, and at other times to "clean up" the orchard. I believe this

practice, with the aid of the birds and helpful insects held the injurious insects in check. Some places the codling moth was much in evidence and did considerable damage, but not so in orchards kept "cleaned up" in this customary manner at that time. Farming operations expanded rapidly with the desire to do big things, which seized every person of imagination at the time. The "get rich quick" idea became rampant and the tendency was to specialize.

The best of all farm crops—children, left the farms everywhere. Some swarmed into the cities to become great business magnates, if they won, otherwise, to sink into oblivion. Others homesteaded the great plains from the Dakotas to Texas, each intent on being a bonanza wheat grower, stock grower, cotton grower, or grower of some other one thing. Still others went to the fruit sections to become bonanza orchardists.

The limitations of this paper will not allow any recital of the constructive big things accomplished by this great crop of children that surged away from home in the great migration at this time. A recital of them will keep publicists, from poets to historians, busy for the coming one thousand years. I refer to this great migration for the purpose only, of calling attention to the decadence of the "farm orchard" by reason of the revolution in farming methods, due to the introduction of farm machinery and the general awakening of the people at this time.

Practically all food growers become speculators, chasing the one crop "will o' the wisp." The old, sure, slow-going farm home, where everything needed by the family was grown or made, went out of existence. In the mad chase for wealth, the barn-yard was denuded of fowl, and the fields "cleaned" of every bird or animal that might eat a grain of the crops or touch a cherry in the orchard. Every fur-bearing animal or migratory bird was ruthlessly killed for sport or profit. The one-crop enthusiast was supreme and would brook no interference. Farm machinery had come to his assistance; why should he be guided longer by agricultural history or experience, or held back by fear of the inexorable laws of Nature? He could cultivate and crop ten acres easier than his forbears could one! In his enthusiasm he knew that thousands of years ago it was written: "Great labor is created for all men, and a heavy yoke is upon the children of Adam, from the day of their coming out of their mother's womb until the day of their burial into the mother of all."

Not one in all this great hegira of farm children expected to escape the labor and travail decreed for the sons of Adam. He hoped, however, to free his children and children's children from the labor yoke, to educate the race, to eliminate poverty and drudgery, and ring in the millennium that has been so long dreamed of and prayed for. He had

no time for farm herds or hog pens, for poultry or garden, for small fruits or orchard, for windbreaks or shelter belts. His, was a wheat farm, a commercial orchard, or a stock ranch. However, he overlooked the fact that his open air life, with plenty of work, and with good virgin soil products for food, was exactly the environment for the production of the greatest of all crops—children—and in his declining days could not understand why his superhuman efforts had not increased the production and bettered the product.

This great migratory wave of vigorous manhood tore up the virgin soil by townships, counties, and states, and planted its one-crop banner from Manitoba to Mexico. This, with the killing off of all helpful birds and animals, further upset the balance of nature everywhere, and the shielded and coddled children of this great generation of men, handicapped by too tender nurture, must undertake the heculean task of restoring the depleted soil and rescuing the country from the plague of insects and fungus and blight.

The Mission of Horticulture is to attend to and assist in the pressingly urgent work of constructive conservation necessary to bring back and restore the balance of Nature. To put back the humus and bacterian life of the soil which has been removed and destroyed by the one-crop method. To divide the farms and establish a rotation of crops that will increase production, and, at the same time, maintain and increase the fertility of the soil.

The Horticulturist knows that plants derive food from the atmosphere in quantities even greater than from the soil, and that a fertile atmosphere is only found over and about a fertile soil, evidently, deriving its fertility from gases generated in and escaping from the fertile soil. He also knows that the atmosphere over and about depleted, sour, and infertile soil is not conducive to plant growth. This brings them closer to and gives them a clearer realization of their dependence on Mother Earth.

Mother Earth, if not the source of life, is certainly its base, its first foothold. There is a oneness of life. It rises in an ascending scale from Mother Earth. It is first manifested by the bacteria in the soil. Improper treatment of the soil or of any of the ascending forms of life arising therefrom is avenged by Nature, and the destruction of life, at any of its stages, results in a destructive stratum or stage of life, whereas, under normal, proper treatment, a constructive form results.

A famished soil will not nurture and produce vigorous plants. Imperfect plant food makes imperfect, weak, sickly plants. All plant growth is dependent upon the fertility of the soil. All animal growth, including man, is likewise, and as a consequence, dependent upon the fertility of the soil. Therefore, the vigor, ability and efficiency of the race is

dependent upon the fertility of the soil. All decadent civilization went down with the depletion of the soil.

Fertile soil means soil having the elements and the life which enables it to produce in perfection food for animals and man. The depth of the earth's surface which has in proper combination the substances and bacterian life which justifies the term fertile, is very slight. When this five or six inches (sometimes as much as twelve inches) has its fertility exhausted, or is blown away or washed away, it requires a long time, measured by generations of men, to restore its fertility or to build up, ariate and incorporate life into a new stratum.

The Roman Campagna, fertile at the time of the Caesars, is being gradually and laborously restored now. Great efforts are being made to restore the soil of New England and portions of the South. Palestine, the Holy Land, that "flowed with milk and honey" and produced the only perfect man—the Savior—is now a desert. It was denuded of timber. A poor system of agriculture worked the humus and fertility out of the soil, and desert conditions resulted. The inhabitants of the Holy Land now are weak, poor and sickly. Strong, healthy domestic animals and people are formed only on fertile soil.

We rejoice in the fact that our soil in the Northwest is still fertile and are doubly fortunate that conservation is being practiced everywhere. We are dangerously near to soil exhaustion and must exert every effort to conserve and protect it. It means conserving and protecting every form of life from bacteria to man.

We should correct as far as possible our criminal negligence in the matter of domesticating our grand wild animals, birds and plants. Our buffalo is much superior to the bison of Europe. The only important bird we have brought in from the wild is the aristocratic, delicious turkey. The grouse, prairie chicken, quail, goose, duck and many others of our grandest of birds and all our fur-bearing animals, every food plant, all our splendid ornamental shrubs and gorgeous wild flowers and every helpful insect should be domesticated.

The potato and many of our beautiful wild flowers have been developed in Europe and sent back to us as examples of what can be done. Prof. Hansen's work in hybridizing the Sand Cherry and plum and splendid Sunbeam raspberry gives millions in wealth to the Northwest instead of making a millionaire of him.

Our native wild roses that persist in the bush, as well as tree varieties, in spite of cultivation and fire and every other effort to eradicate them, invite the advent of a Dickson or a Vilmorin to give this queen of flowers honor in her native heath.

School children everywhere should study agriculture and horticulture. They should know the structure and manner of growth of every plant, particularly of the field and garden crops, and the weeds of their vicinity, and the trees and shrubs and flowers. They should know every local plant, from the most inconspicuous grass or weed to the largest tree, so well that they could identify and name any of them on being shown any portion of their structure, or identify the seed, blossom, flower or fruit. This would bring them near to nature and feed their souls on the beauties of fields and gardens and orchards. And they will love the problems of the care and culture and growth of every living thing. Then the question of how to keep them on the farm will be settled.

They should know the cost of production of all grains and fruits, their food values, and the price they should bring on the market, as well as what they should cost the consumer. Then shall efficiency in marketing eliminate false weights and measures, and the adulteration of foods and fabrics, and all unsanitary laundries, bakeries, and stores. Each farm shall more largely supply the farm needs and the nation its needs and there will be less distribution of pests and contagious diseases.

They should know the helpful insects and birds as well as the destructive ones and how to conserve and assist and work with those great life divisions and forces toward the perfection of Man. They should not poison or kill those helpful friends in the lower strata of life and we hope that they will not kill or slaughter each other.

We should have no patience with cooks, who, on account of laziness, indifference or ignorance, discard our superior hard wheat flour for that made from inferior soft wheat, nor for those who do not use whole wheat flour. When the pericarp, the outside cover of cereals, is discarded, the best of all food elements, the Vitamines, goes with it. Vitamines are a newly isolated group of notrogenous compounds without which we are unable to assimilate food. Fresh fruits and vegetables, milk and meats are rich in these compounds and so are cereals when not hulled. We always believed that scurvy and beriberi would appear if we could not have fresh fruits or vegetables and that bran bread was good for us. Science, now, confirms our belief and explains the reason therefor. Here again, horticulture ministers to us and admonishes us to keep near to Nature and have the orchard and small fruits and garden. We are nourished by the food we assimilate. Any other food eaten is injurious. Hence, if the process of assimilation fails, we starve.

A sympathetic American lady who complained to the commander in Rome because the soldiers were not furnished white bread was shown she was mistaken. The black loaf is a balanced ration, the soldiers would starve on light wheat bread.

Our diminishing yield of cereal crops admonishes us to look to other sources of food supply before our population overtakes production. Our hardy fruit and nut trees must be preserved. They are of the deep-rooted plants that produce the most nutritive food for men and animals. They are perennials. They take care of themselves when once planted and yield enormously. The food of more than one-third of the human race is exclusively fruit and nuts. As people advance into the grain eating class the question of food supply becomes more acute.

We must plant largely of our native fruits and nuts to provide a future food supply for ourselves and for our friends, the birds, and to furnish us shade and protection, and the birds a home and nesting place. These can be planted as the outside row of a shelter belt along the south side of each farm. The balance of the shelter belt should be native evergreen or broad leaved trees and there should be enough of them to make an effective windbreak for the farm. Such a windbreak is a necessity in order to protect the farm from our hot, destructive winds from the south and southwest. After a shelter belt is well established and of reasonable height, its protection benefits will balance its entire cost every year of its existence.

There is a prevailing idea that trees are too costly and hard to grow and that elaborate and careful preparation of the ground is necessary. The experience of many justify this idea, nevertheless, there is nothing so valuable that can be bought for so little money or cared for with so little effort. The secret is to get native trees grown from native tree seeds.

Tree seeds are gathered commercially only in the South where there is cheap negro labor, or in Europe. It is argued that an elm is an elm, a box elder is a box elder, etc., and while the species are the same, the variety of elm or box elder grown in the South will not grow with us. It is more costly to gather our own tree seeds than to buy the Southern or European seeds, but they should be gathered and used.

Grow your young trees from native seed, or buy them from a nurseryman who does, and plant two or three year old trees, three to four foot size, with strong roots. Open deep trenches with a plow in any cultivated land; get into the trench, hold the little tree upright while you draw the earth in small quantities around the roots, first from one side and tamp it, then, from the other side and tamp it, until the roots are well covered. Don't fear to put your whole weight and some strength with each tamp. The earth can never be made too solid about the roots of a transplanted tree. Remember, the roots cannot reach around for the earth and they cannot live exposed to the air and that all open spaces in the soil are filled with air.

The native hardy tree properly (solidly) planted in windbreak or shelter belt planting in any cultivated soil, not alkaline, will grow and take care of itself. The closer they are planted, the sooner they will shade the ground and establish forest conditions, and the better they will stalk up into tall trees and prune themselves.

By all means plant an orchard. Plant hardy apples; crabs; plums; and Hansen's hybrid cherry-plums; the small fruits; currants, gooseberries and raspberries; our native Juneberry, Buffalo berry, etc. They are so easily grown and so profitable to grow that no family can excuse themselves for not having them.

Horticulture will aid us when we fence our farms and divide them into fields. Posts and lumber are too expensive and should we all begin fencing, the price would be prohibitive and the material exhausted. Surround your farms and divide your fields by single rows of poplar or white willow and when you wish to fence, nail two by two inch strips on your trees and staple the wire to the strips. Poplars grow well in single rows, never in close plantings. Living posts that will last for a life time can be had in this way for much less cost than timber posts that will last only for six to ten years. Besides, by planting your row of living posts close enough, it will be worth more than its cost as a wind-break, and in a few years its yield of lumber will repay its cost many times. The rows of trees will give beauty and distinction to the farm and add greatly to its value and be a source of comfort, satisfaction, and pleasure, not only to the owner of the farm and his family, but to every person in the neighborhood and every passer-by. Do this, by all means, if you intend to keep the farm and I commend it as a sure way to get a purchaser if you wish to sell.

Horticulture aids in making the farm cosey, comfortable and home-like; in making it beautiful and interesting; productive and profitable; in a word, it makes a home on the farm.

PLANTING.

A committee of the Sixth Dry Farming Congress, appointed to investigate "The Work of Tree Planting As Directly Affecting the Farmer," in a lengthy, well prepared report recommended the planting of trees for the following purposes: "1. To establish windbreaks and shelter belts to protect his fields, garden, crops, orchards, stock and buildings. 2 To establish plantations of a more extensive nature for the purpose of producing fuel, fencing material and other timber so frequently needed on the farm. 3. To add to the comfort of his home by providing surroundings of a restful and beautiful character, which can be secured in no other manner than the planting of trees, shrubs and flowers."

In the older settled states and communities you will find that the farmers who have planted fruits and trees were the successful ones—the ones who stayed on the land and did not want to sell or move to town. This is also true with us. The knowledge and pleasure gained by the growing of trees and fruits has been a great help to them as farmers and the trees and fruits have greatly added to the value of their farms. When such farms are offered for sale, they always find a ready purchaser at a much higher price above other similar farms than the cost of the trees. Many localities in this state, in western Minnesota, South Dakota and Manitoba show how the country has been transformed from a wind swept prairie wilderness to fruitful fields and beautiful groves and orchards. Those are the localities of high priced farms. The planting of trees has given distinction to the farm and the farmer who plants them.

On the high points plant Willows, Box Elder, Ash or Elm. If they are planted in rows four feet apart and the trees two feet apart in the row they will hold snow enough to irrigate themselves, and when three to four years planted they will hold enough snow to also irrigate the surrounding crops. Even the little snow held by railway snow fences on the high points has an appreciable effect in irrigating surrounding crops. A fifteen to twenty row windbreak will hold snow enough to irrigate itself and surrounding crops for a long distance on either side.

Every tree, shrub and plant is a living organism. It eats, drinks and breathes. It must be given a chance to do these things. Treat the trees, shrubs and plants as living things. Give them the care you give your garden vegetables and they will live. *When planting, tramp the earth solidly about the roots.* The roots absorb moisture from the earth by contact. If the earth is loose, too much air surrounds the roots, dries them and prevents their contact with the earth. You must have the earth solid against the roots. The roots cannot go to the earth—it must be brought to them. This may be a repetition but we consider the information vital.

SEED AND STOCK ACCLIMINATION.

O. D. Center, the Better Farming expert, says: "The people of North Dakota have relied on seed corn growing in other states. This corn has been produced under different conditions and different soils and in areas where there has been a longer growing season. Naturally, it has not done well when brought under new conditions and a shorter growing season. For these reasons we have failed to realize the greatest possibilities in the corn crop. Whether corn in this state shall become an important factor as a farm crop depends upon the one word—Seed. All other factors are present."

The only tree or plant of any kind that can be relied upon in this climate is one that will endure dry and cold

conditions. Practically all tree seeds are gathered in Europe or in the South. *These Southern grown seeds, trees, or plants grown under humid conditions will not give satisfaction here.* They are only valuable farther south. All seeds as well as plants and animals, are produced to greater perfection in the North. If you know of any chestnut, hickory, evergreen or any valuable variety of tree not common in the North that is bearing seed, do not fail to gather them, Write your nurseryman or seedman with reference to their value.

It is an immutable law known to science and sense that seed origin is the basis of all successful planting. To thrive and be hardy in any climate and soil it is essential that a tree or plant be germinated from seed produced in a similar climate or soil. Our seeds are collected from native trees or from trees grown on high prairie soil under cold and dry conditions. They are stocky, robust and vigorous. They weigh five times as much as trees of the same species, grade and height furnished by other nurseries. We carry nothing in storage. We do not cellar our trees. When your order is to be shipped, we take the trees from the ground, count, inspect and grade them under cover, properly pack and ship them fresh from the ground.

EVERGREEN AND DECIDUOUS WINDBREAKS FOR THE WESTERN PRAIRIES.

Address Delivered by John W Maher at Minnesota Horticultural Meeting, 1911.

Windbreaks are necessary to enable us to raise more and better live stock, to grow more fruit, to conserve the fertility of the soil and do better farming. In a word, they are necessary to make farming more profitable and farm life more enjoyable.

The thoughtful home builder will provide a shelter against the wintry storms by a judicious and careful planting of evergreens. Two rows of evergreens planted so as to break joints will give more protection against the cold wintry winds than ten rows of deciduous trees, while four rows of these trees will make an impenetrable wall, through which no wind can blow. In the dead of winter, when all deciduous trees are bare and leafless, the evergreen stands forth in its magnificence—an ornament as well as a shelter. It is thriving and arrayed in all its beauty when all other trees are barren and dormant. It is equally valuable in protecting us against our summer siroccos. A few rows of evergreens are as good as numerous rows of deciduous trees, because of the density of their foliage from the surface of the ground upward.

The varieties to plant in consideration of their hardiness and value are as follows: First, is our native Western Yel-

low or Bull Pine, the Ponderosa. This tree defies drought and cold and the hot winds and burning sun and grows singly equally as well as in solid or mixed plantings; next in order the Jack Pine; the Colorado Blue, the Douglass, the Black Hills, the Englemann, the White and the Norway Spruces; and the Austrian and Scotch Pines are likewise very satisfactory in shelter belt plantations.

In my shelter belt of deciduous trees for the field I would always have the outer row on the South or West. For this row I would plant Caragana, Buffalo Berry, Russian Olive, Wild Cherry, Juneberry, Wild Plum, Thornapple or Willow. These limb from the ground up, are absolutely hardy and will protect the balance of the shelter belt from the drying winds and sun. The next row would be of Carolina or Norway Poplar or White Willow to supplement the shelter for the remainder of the belt by carrying it high above them and assisting them to come up quickly. Next I would have four to six rows of native Green Ash, White Elm, Silver Maple, Black Walnut, European Larch, Hackberry or Wild Black Cherry, alternating or following each other until at least eighteen rows are planted, making with the two rows to the outside, twenty rows in the shelter belt. Less than twenty rows of deciduous trees will not make a complete shelter belt that will protect itself from sun and wind and snow and at the same time quickly establish forest conditions, hold snow enough to carry it through dry seasons, and rapidly tower up into high growing trees, having a far-reaching effect as a protection to the field.

If the shelter belt is designed to protect the home buildings and stock, plant the same number of rows and the same varieties in the same manner, with the exception that the North and West should be the outside and that this row should be trained as a hedge or limbed to the ground. The native fruits above mentioned, which are valuable in the home and as food for the birds, might advantageously be transferred to the inside of the planting, at least as to the North wing of the belt. It would be well also to plant for a snow catcher, two rows of Willows six or eight rods to the north and west of and parallel with the main planting. The intervening space could be used for orchard, garden or meadow.

Close planting causes the trees to shoot straight up and make tall trees instead of letting them limb out and remain low. For example, the Elm is inclined to waste itself in limbs unless planted closely but when so planted it stalks up as well as other trees.

In planting, plow deep furrows, going two or more times in the same furrow if necessary. Hold the tree erect in the furrow and draw the earth from each side with the feet and tramp it solid about the tree until the roots are well covered. The balance of the earth to fill the furrow can

be better worked in gradually when cultivating the trees. When using small trees, each man should plant 2,500 trees in ten hours by this system and do better planting than if done with a spade. Plant in rows four feet apart with the trees two feet apart in the row. This gives each little tree eight square feet in which to grow. This is ample room until the tree attains a height of twelve to fifteen feet, when Nature herself will begin to thin the planting or the owner can cut out the weaker trees for poles or firewood to transplant or sell.

A man who digs the holes with a spade and plants 75 to 100 trees feels that he has done a day's work. He had much better dig holes with a team and plow and plant 2,500 to 3,000 trees a day into a furrow; he will find it much easier and a better done day's work. Young trees can be bought by the thousand for but little outlay and two men can easily plant 5,000 trees in a day. Any farmer can profitably spend a few days each spring planting trees. The time required to cultivate them during the season is of no consequence as they can be cultivated each time the potatoes or garden is gone over. Two seasons' cultivation will be sufficient when the trees are closely planted and after that the trees will shade the ground and care for themselves. Before one realizes it, he has a grove that will take care of itself and ever after be a source of pleasure, satisfaction and profit.

If the outlay for small trees is too much, prepare your ground as for a garden and get and Willow cuttings from your neighbor or from a nurseryman, mark your ground with a corn marker, insert the cuttings one foot apart in the marks, setting them as solid as possible and leaving one bud exposed and cultivate them thoroughly for three or four years. These Poplars and Willows will make very effective windbreaks in a short time as they are the most rapid growing trees we have during their first years of growth. There is no excuse for sitting around and complaining about the treeless appearance of our farms. Trees are not expensive. If five or ten dollars per 1,000 for little trees is too much, then get the cuttings at two to three dollars per 1,000 or cut them yourself in your neighbor's shelter belt.

Railway corporations find that shelter belts are cheaper and more effective than snow fences and at the same time that they are valuable for the timber produced and as an attractive improvement to their property.

I am trying to point out the best way to plant trees, the easiest way and the cheapest way. And I plead for their planting. There are no improvements you can make on the farm that will yield such valuable and rapid returns upon the investment. This is because the shelter belt will constantly add to the value of the farm and because the cost of the trees and their planting is so small.

We pioneers have neglected to plant shelter belts and still remain idle discussing the subject, while the winds, year

after year, mow down our young crops, shell the ripened ones and blight the growing ones. The snow piles around our houses and barns and buries the hay stackks and the "North Wind" doesn't feel as though it were "tempered to the shorn lamb." However, the shelter belt will temper the "North Wind" to your profit and to the comfort and pleasure of your household and barnyard occupants.

Furthermore, the winds and waters are carrying away the soil from our fields and robbing them of their humus and depositing this soil so carried away with its humus and richness, in the low places, that are covered with grass and in the groves and shelter belts. Wherever the ground is covered, this covering retains the drifting soil and fertile humus and the bare ground is robbed by the winds and waters to the benefit of the ground that is covered. Moreover, the grasshoppers and the bugs and the grubs and worms are becoming altogether too numerous. We need to encourage our friends, the birds, by furnishing them food and shelter and nesting places, so that they can raise more birds to work for us and protect us from the plague of locusts and devouring insects.

The shelter belt has not only its esthetic side, which is not to be despised, but also its practical side, and I believe we have done without its protection much longer than we should have, to our great damage and discomfort, and that out of sheer necessity we must plant it.

Shelter belts prevent the moving and carrying away of humus and the other most fertile constituents of the soil. They capture and hold the humus and fertile soil which is carried away from the neigboring lands. These losses and accretions are not inconsiderable. We have the upland and the bench and the bottom, the sandy pieces and the clayey pieces, all due mostly to the action of wind and water in transferring the soil or its constituent parts. They take from one place and give to another.

The high winds and the torrential rains on the plains cause a much greater soil movement than that which takes place in our humid sections, where the velocity of the wind is not so great, the rain storms less furious, and the earth's surface more moist and better covered by vegetation. There are also great losses throughout the Eastern states, where the forest clearings are large, and we find that the thoughtful agriculturalist is protecting his holdings by shelter belt plantings of trees and by terracing his land, leaving strips of grass to hold the soil.

On the Azore Islands the lands are divided into narrow strips and protected against the winds by high stone walls, supplemented by rows of tall trees. Crop raising was found to be too hazardous without this protection.

The lands for many miles around Mount Vesuvius are fertilized by the imperceptible deposits of dust and ashes

carried to them by the atmosphere and winds.

Another remarkable illustration of the transference of soil by the elements is found in the ancient city of Rome, which was originally situated on seven hills. These hills are not so noticeable at the present time and the excavations in the Forum, which is situated in a valley, shows that the ancient street level was more than thirty feet below the present street level. Such has been the result of the unsettled and changing surface of the soil. Similar cases are found in all the old countries.

On the plains the soil movement by the action of wind and water is so great that the saving and conserving of the soil itself amply pays for the shelter belt. It pays to keep till give careful thought and study and it is a subject, also "throws his to the wind" it pays to capture and add them to the "leeward" of your shelter belt.

We are trustees only, for the time being, of the small portion of Mother Earth to which we each hold title and we are by right and conscience bound to transmit it unimpaired to the next holder. The conservation of the fertility and productiveness of our portion is a subject to which we should all give careful thought and study, and it is a subject, also, for the thoughtful attention and study of our statesmen and lawmakers.

One of the greatest oversights of the early settlers on the prairies was their failure to plant shelter belts and groves. The few that were planted have proven to be the best investment made by those who planted them, and this, too, whether they retained or sold the land. A land purchaser will gladly pay well for the grove or shelter belt and in almost every instance will take the land so improved at its additional value much more readily than he will the land barren of trees at any price.

THE PROTECTIVE GOOD OF WINDBREAKS.

Germany has forty-five per cent of her total land area under the plow and twenty-five per cent of it in forest. There is no censorship with reference to farm crops but no man can cut down a tree unless he plants one to take its place. The Germans must be credited with knowing how to farm. They support sixty million people on an area smaller in size and less fertile than the two Dakotas and Montana and less is heard of the high cost of living there than here notwithstanding our enormous area of fertile land.

Our agricultural department has plant scouts scouring the earth for drought-resistant plants for our plains area of which we are a part. We can grow the better varieties of all farm crops, if like the Germans or any other people who know how to farm, we protect our fields from our blighting burning winds that destroy the crops and rob them of moisture.

Some think our land is too valuable to devote a portion of it to timber growth in order to protect the balance. In the Po Valley, in Northern Italy, of which Milan is the commercial center, every field is surrounded by a row of trees and the fields will not average to exceed ten acres each—land is worth from \$200 per acre up. None of the fields are being enlarged but, on the contrary the larger ones are being sub-divided by rows of trees.

We take credit for having restored or rescued large areas of what was known as the "Great American Desert." We must have a care or it may develop that we have only extracted the surplus fertility of those areas and left it more of a desert than ever. New England was not a desert but our same system of agriculture practically made it one.

The agricultural scientists estimate that one thousand parts of water are required to produce one part of dry matter. (Dept. Year Book, 1910.) Plants drink their food in dilute solutions. It behooves us to conserve the water in our fields that it may bring food to our crops.

"The significance of high wind velocity becomes more apparent when its effect upon the rate of evaporation and the consequent drying effect upon soil and plants are considered. Everyone knows that the air takes up water much more rapidly on a windy day than on a calm one, but to get any definite relation between evaporation on a still day and on a windy one is very difficult. Prof. Thomas Russell's experiments with instruments constructed for the purpose gave the following results for evaporation from a water surface. With the wind at 5 miles an hour, evaporation is 2.2 times as rapid as during calm; at 10 miles an hour, 3.2 times; at 15 miles, 4.9 times; at 20 miles, 5.9 times; at 25 miles, 6.1 times; at 30 miles, 6.3 times."

These estimates are based on ordinary summer temperature. The rate of evaporation is increased many times when the winds blow hot. Our fields and crops can stand many days of high winds at the ordinary temperature, but two or three days of hot winds will suck them dry and leave the crops blighted and dead. Dead, because all the moisture has been extracted from them.

Angus McKay, Supt. Sask. Experiment Farm and Dominion Forestry Farm, which are both located at Indian Head, Sask., says: "In 1889 we imported trees from Ontario and the United States and planted them. They did not do well and finally died. Then we gathered ash, box-elder, and other native seed from which we grew trees in nursery rows. We now have 13 miles of driveways on the farms, the trees on each side of which form a closed arch over the road. Strips of trees divide the farms into fields of 20 and 100 acres. These strips or windbreaks are helpful to the crops for a distance of 80 feet for each foot in height. Our wheat

on summer fallow will go 35 to 40 bushels; oats, 80 to 100 bushels; barley, 55 to 65 bushels."

Dr. J. H. Worst, director of N. Dak. Exp. Station, in an address at the sixth annual Dry Farming Congress, said: "If we had a row of trees every mile there would be no destructive blizzards, no more hot winds. The very timber that would grow would be worth ten times the amount of the time and labor necessary to bring it to maturity. The birds that would nest in their branches would destroy insects that otherwise would destroy property worth many times more than the cost of those trees, while every leaf would be absorbing heat and making the air more humid. In this simple and comparatively inexpensive manner we could cure that great evil known as 'hot winds.'"

Mr. D. F. McLaughlin, of Cando, tells of a grove on his land saving a crop of flax in the spring of 1911 on the windward side of the grove. In this case the wind when reaching the grove must have been arrested and held until a triangular space extending a long distance to windward became filled with dead air held in place by the pressure of the wind passing over it and causing the moving current to raise from the ground level long before coming to the grove. Or, the damage may have been done in the wake of the wind by the pulling effect of the wind on the soil and the grove raising the wind prevented the pulling effect.

Dr. Sanders, director Can. Exp. Farms, says: "The protective influence of a forest growth is about 50 feet for every foot in height. Trees 15 feet in height protected grain from a very violent storm for 750 feet while beyond that the grain was thinner and thinner and a little farther on the whole crop was entirely wiped out by the force of the wind." Proceedings 4th annual meeting Can. For. Assn.

A. P. Sandies, secretary Ohio Board of Agriculture, says: "We must either re-forest our denuded acres in Ohio or build cyclone cellars to provide safety from the windstorms that are becoming common in this state."

Judge Whiting, of Iowa, said: "With almost mathematical precision, the protection from windbreaks amounts to one rod on the ground to each foot in height." P. 377, Iowa '04.

M. Becquerel, a French scientist, says: "That in the Rhone Valley a hedge 6 feet high will protect delicate garden plants to a distance of 70 feet." These are about the same ratio as 1 to 11. Prof. Baker, Iowa '04, P. 377.

Bulletin 11 of Weather Bureau by G. E. Curtis, estimates that in 1888, 21 million bushels of corn were lost in Kansas by hot winds.

DEVILS LAKE NURSERY, - - Devils Lake, N. D.

